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ABSTRACT

Variables that influence growth and change in educational outcomes in the last 2 years of high school were studied using data from the High School and Beyond (HSB) study. The HSB study provided a database of thousands of variables for about 30 students from each of 1,000 randomly selected high schools in the United States in their sophomore and senior years and 2 years after graduation. This research summary briefly reviews studies on: (1) effects of public, Catholic single-sex, and Catholic coeducational high schools on achievement, affect, and behaviors; (2) effects of attending single-sex and coeducational high schools on achievement, attitudes, behaviors, and sex differences; (3) sex differences in the development of mathematics and verbal self-concepts; (4) failure of high-ability schools to deliver academic benefits; (5) influence of internal and external frames of reference on formation of mathematics and English self-concepts; (6) effects of employment during high school; (7) effects of extracurricular activities; (8) effects of participation in sports; and (9) changes in achievement, attitudes, and behavior in the last 2 years of high school for students from different family structures. Methodological implications from these studies are discussed. Three tables and 5 figures present data from the various studies, and 15 references are included. (SLD)

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WHAT MAKES A DIFFERENCE DURING THE LAST TWO YEARS
OF HIGH SCHOOL: AN OVERVIEW OF STUDIES BASED ON HIGH
SCHOOL AND BEYOND DATA

Herbert W. Marsh
University of Western Sydney, Macarthur

Paper presented at the 1992 Annual Meeting of the
American Educational Research Association
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INTRODUCTION

The purpose of this paper is to summarize my research on variables that influence growth and change in educational outcomes during the last two years of high school that is based on the High School and Beyond (HSB) data. The HSB is a very large (1000 randomly selected high schools and approximately 30 randomly selected students from each school), nationally representative (of the United States), longitudinal data base consisting of responses by the same high school students when they were sophomores, seniors, and two years after the normal graduation from high school. There are literally 1000s of variables available for each student. The intended purpose of the HSB was to provide broadly available, unified data base to assess influences on educational outcomes during the last two years of high school. In addition to the summaries of individual studies, I also consider common methodological and substantive issues underlying this research. In particular I will discuss the: methodological strengths and weaknesses of this approach to evaluating educational change and school effectiveness, and the importance of academic self-concept as an outcome and as a mediating variable.

In my research I have adopted a general paradigm (Figure 1) in which variables are classified as background variables (e.g., gender, race, SES, ability level), sophomore/senior outcomes variables (e.g., self-concept, locus of control, scores on standardized achievement tests, school grades, course selection, academic effort, getting into trouble, educational aspirations, occupational aspirations), post-secondary outcomes (university attendance, educational aspirations, occupational aspirations), and the specific independent variable of interest. The independent variables in different studies have include: student gender, public vs. Catholic schools, single-sex vs. coeducational schools, the school-average ability, part-time employment, participation in extracurricular activities, and participation in sports. The general strategy is to use path modelling techniques to relate these independent variables to senior and post-secondary outcomes after controlling for the effects background variables and/or sophomore outcomes. Because substantially the same variables are considered in the sophomore and senior years, this approach relates changes during the last two years of high school to the independent variables of interest. In most of the studies I have also examined whether these influences vary with (i.e., interact with) other variables such as gender, race, and prior ability. Below I offer a summary of different themes that I have considered.

Insert Figure 1

Public, Catholic Single-Sex, and Catholic Coeducational High Schools: Their Effects on Achievement, Affect and Behaviors.

The large, nationally representative HSB database has stimulated considerable research comparing academic outcomes attributed to attending public and Catholic high schools that is reviewed elsewhere (e.g., Jenks, 1985; Marsh, 1991e). This is one specific example of the more general evaluation of school effectiveness. Using cross-sectional data from the first cohort of HSB data (responses by sophomores and seniors), James Coleman and colleagues concluded that students learned more during the last two years of high school in Catholic schools than in public schools. This initiated heated debate, and a flurry of reanalyses and rejoinders. Whereas the basic issues were unresolved, Jencks (1985) concluded that: "All parties to this debate agreed, however, that the 1980 data were not ideal for estimating the effect of Catholic schooling, since there was no satisfactory way of knowing what seniors in 1980 were like when they were sophomores in 1978, or what sophomores in 1980 would be like when they become seniors in

1982" (p. 128). The availability of the second wave of data provided a much stronger basis for subsequent analyses. Jenks (1985) provided a summary and critique of three initial analyses of the two waves of data. Although there were some differences in interpretations, all three studies concluded that senior Catholic high school students outperformed public high school students, even after controlling for family background and sophomore achievement scores.

My 1991 study (Marsh, 1991e; also see Marsh & Grayson, 1990) extended earlier research in that: (a) affective variables (e.g., self-concept, locus of control), academic choices (e.g., course selection), and post-secondary activities were considered as well as academic achievement outcomes; (b) Catholic single-sex and Catholic coeducational schools were considered separately; and (c) school policies in relation to discipline and academic orientation were examined as a basis of the public/Catholic outcome differences. The results showed relatively larger effects favoring Catholic schools on the selection of academic oriented courses, relatively smaller effects favoring Catholic schools on academic achievement and subsequent post-secondary attendance, and nearly no effects on affective variables. These results generalized across levels of sex, race, socioeconomic status, prior college plans, and ability levels. Catholic single-sex and Catholic coeducational schools did not differ significantly on any outcomes and this lack of difference was consistent for males and females.

Next I examined policy-related variables that might explain these differences. Catholic high schools differ from public high schools in the US in that many school are single-sex schools, discipline policies are stricter, and students are encouraged to take more academic coursework. Discipline policy differences and the single-sex/coeducation distinction existed, but these differences were nearly unrelated to public/Catholic differences in senior and post-secondary outcomes. Controlling for public/Catholic differences in academic coursework selection, however, eliminated public/Catholic differences in all other outcome variables. Students in Catholic schools took more academic courses, this difference remained after controlling background variables and sophomore outcomes, and this difference explained most of the public/Catholic differences in other senior and post-secondary outcomes. Subsequent research applying the LISREL Multi-group structural equation modeling approach to evaluating latent mean differences substantiated these conclusions.

The effects of attending single-sex and Coeducational high schools on achievement, attitudes and behaviors and on sex differences.

In this study I (Marsh, 1989a; also see Marsh, 1989b) (a) compared the effects of single-sex and coeducational high schools on achievements, attitudes and behaviors and (b) determined whether attending single-sex schools affected well established sex differences in these variables. Subjects were 2,332 Catholic high school students attending one of 47 single-sex or 33 coeducational schools in the HSB study. The effects of school-type, sex, and their interaction on senior year outcomes and post-secondary activities were examined after controlling for variables measured during the sophomore year. Changes in a wide variety of outcomes during this critical sophomore-to-senior period were nearly unaffected by school type. Changes in many of these outcomes were related to sex, but these sex differences were nearly unaffected by school type. Interpretations of this study contradict those of earlier studies that were also based on large nationally representative data bases, but the differences were apparently explicable in terms of methodological problems identified in the earlier studies. In particular, whereas there were some differences in sophomore outcomes and senior outcomes that were not controlled for sophomore outcomes, these differences disappeared when senior outcomes are appropriately controlled for sophomore outcomes.

Sex differences in the development of verbal and mathematics constructs.

Sex differences in the development of verbal and mathematics constructs (achievement, attitudes, and course selection) were examined with HSB data (Marsh, 1989c). Longitudinal path models were tested using both multiple regression and structural equation modeling (see Figure 2). Sex differences were typically smaller than anticipated, smaller than those found in

research conducted before the early 1970s, and smaller than observed in the 1972 National Longitudinal Study that used similar academic achievement tests. In separate analyses of data for boys and girls, it was also evident that the determinants of the verbal and mathematics constructs were similar for boys and for girls. The findings suggest that stereotyped sex differences favoring boys in mathematics and girls in verbal areas are diminishing.

Insert Figure 2

The results also added to a growing body of research demonstrating the content specificity of academic affects. As predicted by Marsh's internal/external frame of reference model (see Figure 3), mathematics and verbal attitudes were nearly uncorrelated, better mathematics skills were associated with poorer verbal attitudes, and better verbal skills were associated with poorer mathematics attitudes.

Insert Figure 3

The Failure of high ability High Schools To Deliver Academic Benefits: The Importance of Academic Self-Concept and Educational Aspirations.

Emphasizing a psychological perspective of social comparison processes, Marsh (1987) found school-average ability to be negatively associated with academic self-concepts. Emphasizing a sociological perspective of school context effects, Alwin and Otto (1977) reported school-average ability to be negatively associated with educational and occupational aspirations. The present investigation brings together these two related areas of research, extends the diversity of outcomes examined, and expands the theoretical frameworks considered. In this longitudinal analysis of the HSB data, I (Marsh, 1991d) evaluated the effects of school-average ability on a comprehensive set of academic outcomes (e.g., standardized test scores, self-concept, coursework selection, academic effort, school grades, educational and occupational aspirations, and college attendance) measured in the sophomore and senior years of high school, and two years after high school graduation.

Insert Figure 4

The influence of attending a school in which the school-average ability was higher was not positive for any of the outcomes at any point in time, and was significantly negative for 16 of 18 outcomes. The academic outcomes associated with attending higher-ability schools were not commensurate with the ability levels of students attending these schools, and no academic advantages of such schools were observed for any outcomes. The negative effects of school-average ability were primarily mediated by academic self-concept and educational aspirations (Table 1).

Insert Table 1

Whereas the direction of effects of attending higher-ability schools was consistently negative, the sizes of these effects were typically small and represented an average across 1000 high schools and many thousands of students. Hence, there will be some higher ability high schools that produce academic outcomes commensurate with the quality of their higher-ability students and some students who will be advantaged by attending such higher-ability schools. Important directions for future research are the determination of what individual student variables are associated with benefiting from attending higher-ability schools and school policies that may offset the negative effects of attending higher ability schools. I suggested (Marsh, 1991d) that several policies that may influence this effect are the creation of a more cooperative learning environment that de-emphasizes competition, a greater emphasis on criterion reference tests, externally normed tests, or internal assessments that are not "graded on a curve," and assessment tasks that are unique to each student which discourage social comparison processes.

The influences of internal and external frames of reference on the formation of math and English self-concepts.

Two conceptually different frame of reference effects were observed in research leading to the I/E model and the big-fish-little-pond effect. Combining the two I (Marsh, 1990b) suggested that the effects of school average mathematics ability may be specific to Math self-concept whereas the effects of school-average verbal ability may be specific to verbal self-concept. Using the HSB data, I found math and English self-concepts to be: (a) uncorrelated despite a substantial correlation between math and English test scores; (b) influenced by internal and external frames of reference; and (c) negatively affected by school-average achievement. As posited by the internal/external frame of reference model, better math skills led to much higher math self-concepts but slightly lower English self-concepts, whereas better English skills led to much higher English self-concepts but slightly lower math self-concepts. Consistent with the big-fish-little-pond effect, school-average achievement negatively affected academic self-concept; equally able students had higher academic self-concepts in schools with lower school-average achievements. This school context effect was also content specific; school-average math achievement negatively affected only math self-concept and actually had a slight positive effect on Verbal self-concept (if I am in a school of mathematical geniuses, my Math self-concept will suffer but my Verbal self-concept may be a little higher); school-average English achievement negatively affected only English self-concept and actually had a slight positive effect on Math self-concept. This pattern of counterbalancing effects apparently reflects the internal comparison. In addition to extending theoretical support for both the big-fish-little-pond effect and the internal/external frame of reference model, this study also has important implications for the establishment of schools specializing in a particular discipline.

Insert Figure 5

Employment during high school: Character building or a subversion of academic goals.

Using the HSB study, I (Marsh, 1991a) considered students' responses to questions about how many hours they worked during their sophomore, junior and senior years of high school (see Table 2). Dropping out of high school was associated with hours worked during the sophomore year even after controlling for background variables (e.g., SES, race, sex) and sophomore outcomes (e.g., ability, achievement, coursework, self-concept, educational and occupational aspirations). For continuing students, total hours worked during high school was negatively related to 17 of 22 senior and post-secondary outcomes (e.g., achievement, coursework selection, educational and occupational aspirations, school attendance, going to college) after controlling for background variables and sophomore outcomes. The only positive effect of employment was reducing unemployment during the two years after high school.

Insert Table 2

The negative effects of working were a primarily linear function of the number of hours worked and were reasonably consistent across ethnicity, gender, ability levels, and SES. In contrast to working during the school year, working during the summer vacation appeared to have no negative effects.

Among continuing students who worked during high school, however, working in order to save money for college had substantial, favorable effects on 15 of 22 outcomes including academic self-concept, time spent on homework, educational aspirations and particularly on actually attending college. The challenge "put your money where your mouth is" may be an overly simplistic basis for a motivational theory but seems to be particularly apt in this situation.

Extracurricular activities: A beneficial extension of the traditional curriculum or a subversion of academic goals.

In the HSB study students were asked whether or not they had participated in each of a variety of extracurricular activities in their sophomore and again in their senior year of high school (Table 3). After controlling background variables and sophomore outcomes, I (Marsh, 1991c) found that total participation was significantly and favorably related to 17 of 22 senior and post-secondary outcomes (e.g., social and academic self-concept, educational aspirations, coursework selection,

homework, absenteeism, academic achievement and subsequent college attendance). There were, however, significant nonlinear components to most relations indicating that participation in too many activities produced diminishing returns. The benefits of participation also differed substantially depending on the particular activity. Participation in sport, honor societies, student government, school publications, school subject-matter clubs, church organizations, and community service organizations was consistently beneficial but participation in some activities had mixed or predominantly negative effects.

Insert Table 3

The juxtaposition of the effects attributed to working during the school year and extracurricular activities are informative. Participation in extracurricular activities -- even those that do not appear to be "academic" (e.g., sports) -- have a positive effect on academic outcomes, whereas part-time employment has predominantly negative effects. Applying my "commitment to school" hypothesis (Marsh, 1991c), I suggested that identification with the school and school-related values is fostered by extracurricular activities. To the extent that students derive status from nonacademic school activities, then there also exists a reinforcement to achieve in the academic pursuits that are an important part of the school values. Consistent with this suggestion, much of the benefit associated with extracurricular activities is mediated by academic self-concept. In contrast, part-time employment during high school apparently undermines commitment to school and school-related variables (unless the student is working in order to pay for further education).

The Effects of Participation in Sports During the Last Two Years of High School.

Following up the extracurricular activity study, I (Marsh, 1991b) also examined the effects of participation in a sports during the last two years of high school with the HSB data. After controlling background variables and sophomore outcomes, sport participation positively affected 14 of 22 senior and post-secondary outcomes (e.g., social and academic self-concept, educational aspirations, coursework selection, homework, absenteeism, and subsequent college attendance) and had no negative effects on the remaining 8 variables. These benefits were robust, generalizing across individual characteristics (race, SES, sex, and ability level), school size, and school climates (academic, social and sport). The benefits of participation were mediated by academic self-concept and educational aspirations, supporting the proposal that participation enhances identification with the school.

Two-parent, stepparent, and single-parent families: Changes in achievement, attitudes, and behaviors during the last two years of high school.

In the HSB study, students were asked in their sophomore year and again in their senior year whether they lived with their mother, a step-mother, their father, or a step-father. I (Marsh, 1990b) made comparisons were among 3 family configurations (2-parent, step-parent, and single-parent families) when they were stable during the last 2 years of high school and when the family configuration changed. 22 senior year and post-secondary outcomes were related to different family configurations. After controlling for background variables (sex, race, SES, etc.) and comparable sophomore outcomes, differences in family configurations had little effect on senior-year and post-secondary outcomes. This lack of effect was consistent across subgroups based on sex, race, religion, SES, and other background variables. Results suggest that for a wide variety of outcome variables, growth and change during the last two years of high school are relatively unrelated to different family configurations.

Methodological Implications

1. The need to evaluate changes in outcome variables in correlational and quasi-experimental designs. The appropriate measure of high school effectiveness should generally be changes in appropriately defined outcome measures assessed near the start of high school and near its completion. This is well recognized in some areas of research considered here (e.g., Public/Catholic school comparisons) but not in other areas. A similar consideration is appropriate when evaluating the effects of an independent variable that is not amenable to random assignment. An good example of this problem is evaluation of effects of family configuration and controls for SES. Because students cannot reasonably be randomly assigned to different family configurations, it is necessary to control for pre-existing differences in these groups. One generally unacceptable approach to this problem is to control for background variables such as SES in a single wave of data. Not only is the role of SES as a cause or an effect of family configuration unclear in a single data wave, but SES is only one of the many possible pre-existing differences. When the outcome variable is a change in the same variable over time, the role of background variables -- those considered and those not considered -- becomes less critical. Thus, for example, whereas SES is substantially related to achievement test scores collected in Years 10 and 12, it is almost uncorrelated with Year 12 test scores after controlling for the effects of Year 10 test scores; the effects of SES on Year 12 achievement is all indirect and mediated by Year 10 achievement scores. If the outcome variable is Year 12 achievement test scores corrected for Year 10 achievement scores, then the inclusion or noninclusion of SES in the path analysis is not critical. Similarly, the inclusion of any other variable reflecting pre-existing differences is not critical unless that variable has a direct effect on Year 12 outcomes that are not mediated by Year 10 outcomes.

2. Spurious effects and mediated effects. The distinction between spurious effects and mediated effects is facilitated by the use of longitudinal data. In the extracurricular activity study, for example, there is some indication that college expectations prior to the start of high school are associated with increased extracurricular participation (college expectations may "cause" participation) and that increased participation leads to higher increased college expectations (participation may "cause" college expectations).

Academic self-concept and educational aspirations were given particular attention in several of the studies considered here as "mediating" variables as well as outcome variables. As operationalized here, the effects of some "independent" variable on some subsequent outcome is said to be "mediated" if the effect of the independent variable is substantially reduced when the "mediating" variable is "controlled." Results summarized here suggested, for example, that academic self-concept may be an important mediating variable for the negative effects school-average ability and part-time employment and for the positive effects of participation in extracurricular activities including sports. In contrast, the positive effects of attending a Catholic high school on senior test scores and subsequent university attendance was largely mediated by taking more advanced coursework and being in the "academic" track. In contrast to academic self-concept, general self-concept (or esteem) apparently had limited value as either an outcome measure or as a mediating variable.

3. Nonlinear effects and interaction effects. Although not emphasized in this overview, a number of the studies considered here evaluated nonlinear effects and particularly interaction effects. In the extracurricular study, for example, there was some nonlinearity in many of the relations such that participation in too many activities had diminishing returns. It is important to distinguish between "controlling" for a background variable (e.g., SES) and testing for interactions involving the background variable. In a multiple regression framework, tests for interaction effects (and nonlinear effects) are often evaluated in terms of product variables defined by the multiplication of the "independent" and the background variable. For example, in the extracurricular activity study there was some suggestion that low-SES students derived greater benefits from participation than did higher SES students although the size of the interaction effects were very small.

4. Definition of Independent Variables. For some examples (e.g., Gender) there is no doubt that a variable should become before any of the outcome variables in the causal ordering. In other examples (e.g., Public/Catholic, Single-Sex/Coed, and School-average ability) the placement of the variable in relation to the sophomore outcomes is more ambiguous. For still other examples (e.g., part-time employment, extracurricular activities) in which the independent

variable is defined as a composite of across the Years 10 - 12, there may even be some doubt about the placement of the variable in relation to the senior outcome variables. As with all "causal" modeling problems, appropriate limitations in the interpretations of results should be noted.

5. Effect Sizes. In most cases, the size of effects in my HSB studies are very small, although even small effects are statistically significant when evaluated with such large sample sizes. Particularly when evaluating the changes in stable variables such as academic achievement test scores, no independent variable has much effect. The majority of the variance at time 2 is explained by the same variable measured at time 1. This situation may reflect an insensitivity of the outcome variables in the HSB study to change, the statistical techniques used to evaluate change, or the observation that overall change reflects the net effects of many counterbalancing influences. The results, however, may also indicate that many independent variables that we think should have large effects actually have only modest effects in relation to all the other possible influences. Even modest effects, however, may be sufficiently large to have theoretical and practical implications.

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Table 1 (reproduced from Marsh, 19910)

Total Effects (standardized beta weights) of School-average SES (MEANSES) and School-average Ability (MEANABIL) on Subsequent Outcomes, Followed By Estimates of These Effects After Controlling For Selected Outcomes

		Outcome Variables Being Controlled											
Total Effects		Matching T1 Outcome		ACDSC1		EDASP1		ACDSC1 & EDASP1		All Time 1 Outcomes		ACDSC1, EDASP1 & ACDSC2	
MEAN-SES	MEAN-ABIL	MEAN-SES	MEAN-ABIL	MEAN-SES	MEAN-ABIL	MEAN-SES	MEAN-ABIL	MEAN-SES	MEAN-ABIL	MEAN-SES	MEAN-ABIL	MEAN-SES	MEAN-ABIL
<u>Time 1 Outcomes</u>													
6) GENSC1	02 -08**	—	—	00 -02	—	—	—	—	—	—	—	—	—
7) ACDSC1	07** -21**	—	—	—	—	—	—	—	—	—	—	—	—
8) CRSWRK1	06* -15**	—	—	05* -12**	—	—	—	—	—	—	—	—	—
9) EFFORT1	-01 01	—	—	-03 07**	—	—	—	—	—	—	—	—	—
10) GPA1	-02 -16**	—	—	-05* -08**	—	—	—	—	—	—	—	—	—
11) EDASP1	16** -23**	—	—	14** -15**	—	—	—	—	—	—	—	—	—
12) OCCASP1	08** -12**	—	—	07** -09**	—	—	—	—	—	—	—	—	—
<u>Time 2 Outcomes</u>													
13) ABIL2	05** -03*	05** -03*	05** -02	04** -02	04** -01	04** -01	04** -01	04** -01	04** -01	04** -01	04** -01	04** -01	04** -01
14) GENSC2	04 -13**	03 -09**	03 -08**	02 -10**	02 -08**	02 -08**	02 -08**	02 -08**	02 -07*	03 -05	03 -05	03 -05	03 -05
15) ACDSC2	03 -22**	00 -14**	00 -14**	-02 -15**	-02 -11**	-02 -11**	-02 -11**	-02 -11**	-01 -10**	—	—	—	—
16) CRSWRK2	09** -18**	07** -11**	08** -14**	04 -11**	04* -10**	04* -10**	04* -10**	04* -10**	04* -06**	04* -08**	04* -08**	04* -08**	04* -08**
17) EFFORT2	02 -04	02 -04	00 02	01 01	-01 03	-01 03	-01 03	-01 03	01 01	-01 07**	-01 07**	-01 07**	-01 07**
18) GPA2	-03 -12**	-02 -04*	-04** -08**	-05* -10**	-05* -07**	-05* -07**	-05* -07**	-05* -07**	-01 -04*	-04 -05	-04 -05	-04 -05	-04 -05
19) EDASP2	15** -20**	06** -08**	13** -14**	06** -08**	06** -07**	06** -07**	06** -07**	06** -07**	06** -06**	07** -04	07** -04	07** -04	07** -04
20) OCCASP2	11** -11**	09** -08**	10** -08**	08** -06**	08** -05*	08** -05*	08** -05*	08** -05*	07** -05*	08** -04	08** -04	08** -04	08** -04
<u>Time 3 Outcomes</u>													
21) COLLEGE	06** -09**	—	—	05* -05*	01 -01	01 00	01 00	01 00	01 00	01 01	01 01	01 01	01 01
22) EDASP3	17** -20**	10** -11**	15** -16**	10** -11**	10** -10**	10** -10**	10** -10**	10** -10**	11** -10**	11** -08**	11** -08**	11** -08**	11** -08**
23) OCCASP3	11** -09**	09** -06**	10** -06**	07** -04*	07* -03	07* -03	07* -03	07* -03	07** -03	08** -02	08** -02	08** -02	08** -02

Note. All coefficients, standardized beta weights presented without decimal points, come from one of seven sets of multiple regressions. In the first set, each T1, T2, and T3 outcome was predicted by the set of 5 independent variables (SEX, SES, ABIL1, MEANSES, MEANABIL). In the subsequent sets of multiple regressions, additional outcomes -- or sets of outcomes -- were added to the 5 independent variables. To the extent that the effects of the school-average variables are influenced by the inclusion of additional outcomes, these outcomes are inferred to be mediating the effects of the school-average variables.

* p < .05; ** p < .01.

Table 2 (Reproduced From Marsh, 1991a)Hours Worked during the Sophomore, Junior, and Senior Years of High School^a

Year in School	Estimated Number of Hours per Week Worked (percentage)								Mean ^b	SD ^b
	0	1-4	5-14	15-21	22-29	30-34	35-40	41 or More		
Sophomore ^c	36	28	20	8	4	1	2	^d	6.09	8.72
	(36)	(27)	(20)	(9)	(4)	(2)	(3)	^d	6.60	9.21
Junior	30	12	19	18	10	5	4	3	12.15	12.49
Summer	17	7	10	13	13	10	19	12	22.32	15.65
Senior	23	15	19	21	11	5	4	2	12.84	11.98
Total	10	23	40	16	8	2	1	0	10.35	8.66

^a The students were asked about their most recent job in which they worked for pay, not counting work around the house. They responded to the sophomore item in the sophomore survey and the remainder of the items in the senior survey. For the sophomore and senior items, the number of hours each student worked was estimated to be the number of hours worked on the current or most recent job (the category midpoint) times a weighting factor assigned according to when the student last worked (1.0 if worked last week, .667 if worked within the past month, .5 if worked within the past three months, .1 if worked since the start of school, 0 if had not worked since the start of school). For the junior year and for the summer between the junior and senior years, the students indicated the average number of hours per week they had worked during that period. The total number of hours worked is the mean of the nonmissing responses to the number of hours worked during the sophomore, junior, and senior years (but not the summer).

^b Because of the weighting factor used to estimate the sophomore, senior, and total values, the mean and standard deviations of categorized responses only approximate the mean of the raw score.

^c Values in parentheses are for the entire sample, whereas all other values refer to continuing students.

^d This response category was not provided on the sophomore survey.

Table 3 (Reproduced From Marsh, 1991c)

The Percentage of Students Participating in 16 Categories of Extracurricular Participation in Their Sophomore and Senior Year High School

Activity (Verbatim wording of the items)	Sophomore	Senior	
	Partic	Partic	Leader
Sports			
Athletic teams - in or out of school (sophomore)	57%	--	--
Varsity athletic teams (senior)	--	36%	15%
Other athletic teams in or out of school (senior)	--	41%	10%
Cheerleading			
Cheer leaders, pep club, majorettes	15%	14%	4%
Drama/Debate			
Debating or drama	11%	13%	3%
Music			
Band or Orchestra	17%	15%	3%
Dance/Chorus			
Chorus or dance	23%	19%	4%
Hobby Clubs			
Hobby clubs such as photography, model building hot rod, electronics, craft	21%	19%	3%
School Subject Clubs			
School subject matter clubs such as science, history, languages, business, art.	27%	20%	3%
Vocational Education Clubs			
Vocational education clubs such as Future Homemakers, Teachers, Farmers of America, DECA, FBLA, or VICA	14%	24%	8%
Community Youth Clubs			
Youth organizations in the community such as scouts, Y, etc.	20%	17%	6%
Church Activities			
Church activities including youth groups	40%	37%	11%
Junior Achievement			
Junior achievement	6%	5%	1%
Publications			
School newspaper, magazine, yearbook annual (senior)	--	19%	6%
Student Government			
Student council, student government, political club (senior)	--	17%	7%
Service Clubs			
Service clubs or other community service activities (senior)	--	16%	4%
Honor Societies			
Honorary clubs, such as Beta club or National Honor society (senior)	--	16%	3%
Fraternity/Sorority			
Sororities or fraternities (participation)	--	3%	1%

Note. In their sophomore year students were asked "Have you participated in any of the following types of activities either in or out of school?" to which they responded "Have not participated" or "Have participated actively." In their senior year students were asked "Have you participated in any of the following types of activities either in or out of school this year?" to which they responded "Have not participated," "Have participated actively (but not as a leader or officer)" or "Have participated actively as leader or officer." Senior participation percentages reported here include those participating as a leader or officer. Percentages presented here are based on responses by students included in subsequent regression analyses.

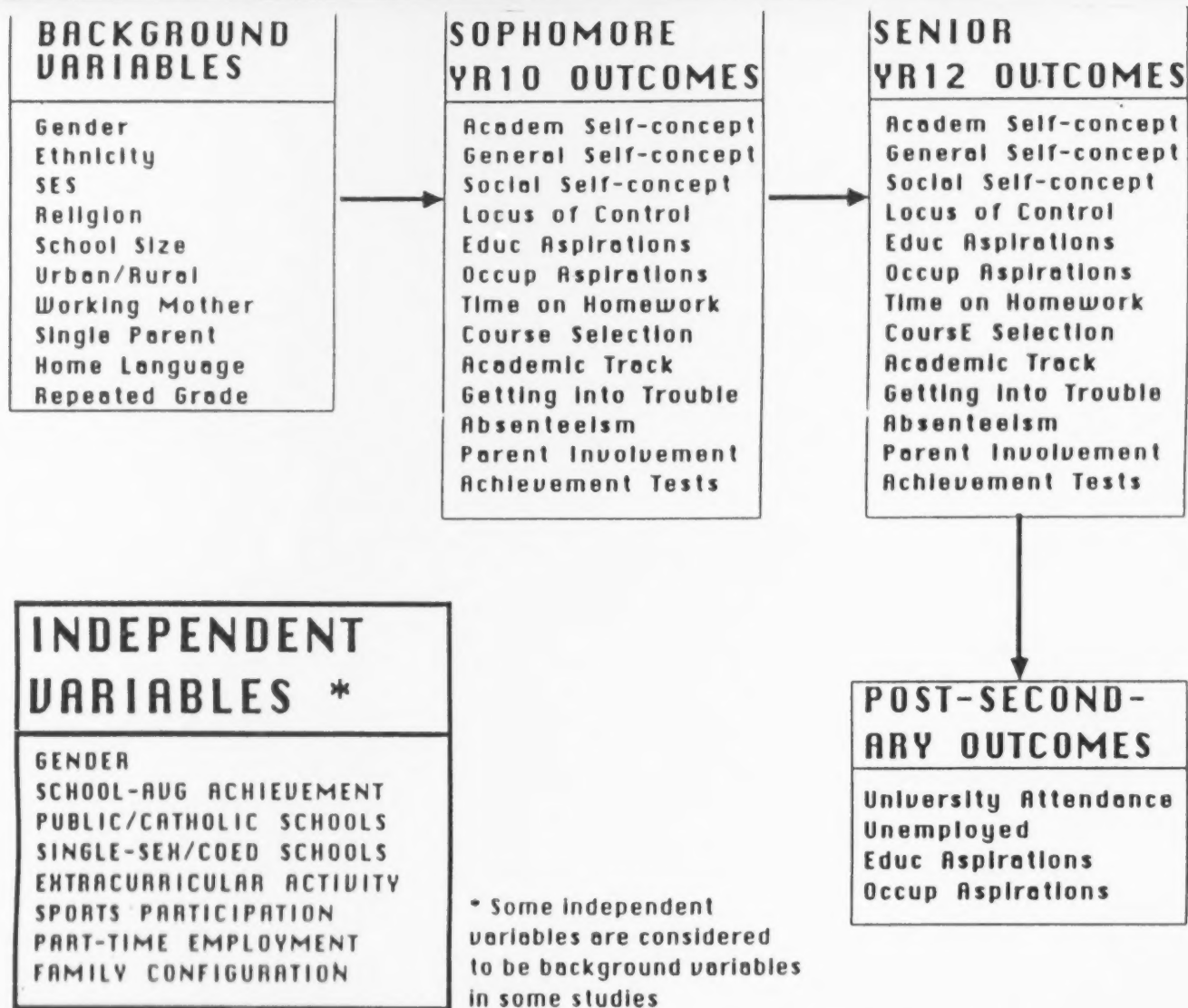


Figure 1. Typical Path Model and Representative Variables Used in the HSB Studies.

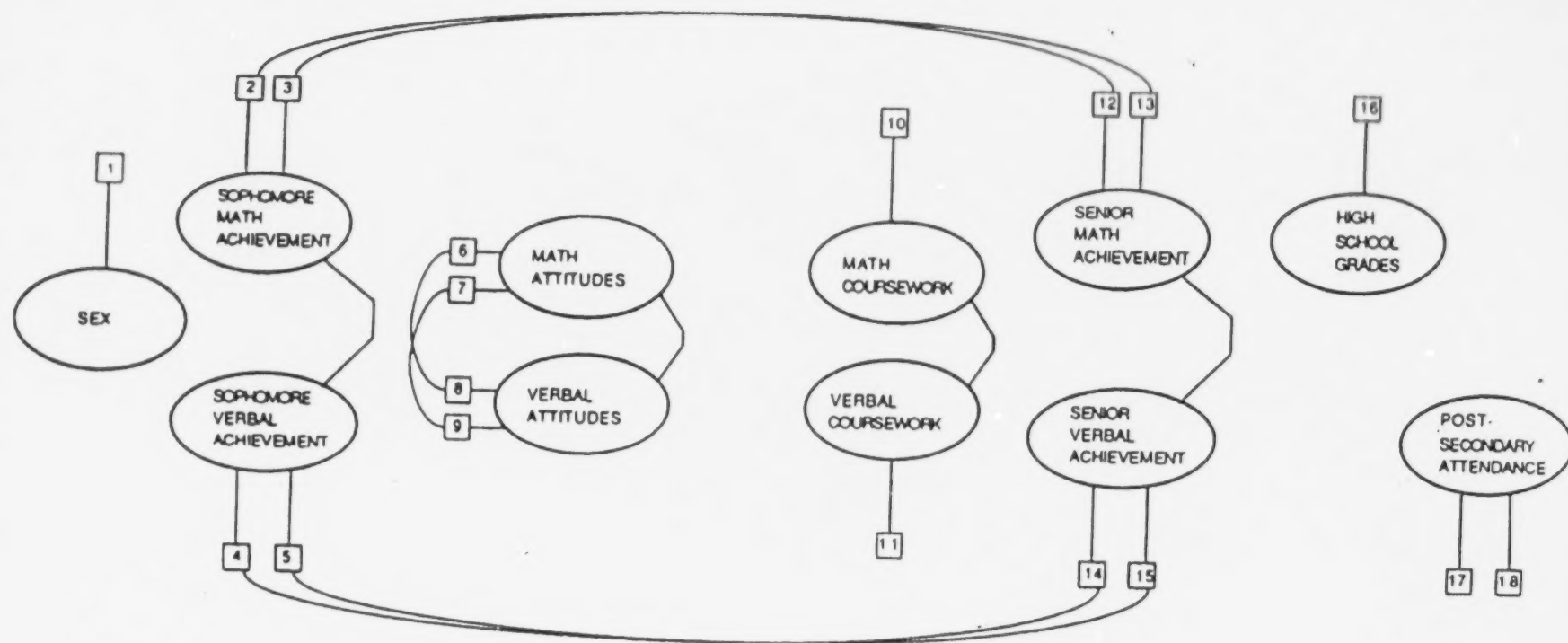


Figure 2 (Reproduced From Marsh, 1989c)

The theoretical path model to be tested in the present investigation

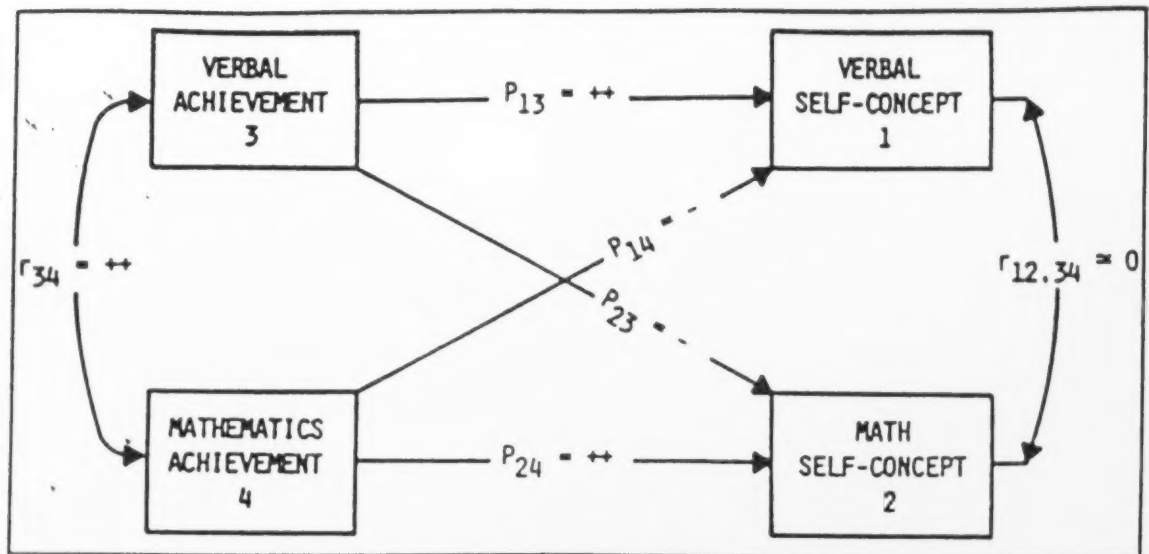


Figure 3 (Reproduced From Marsh, 1989c)

Path model of the effects predicted by the Internal/External (I/E) Frame of Reference model

Note. Coefficients indicated to be "++," "--," and "0" are predicted to be high positive, low negative, and approximately zero, respectively. Tests of the generalization of these findings to the mathematics and verbal attitude measures in the High School and Beyond data are incorporated into the path model shown in Figure 2. From Marsh (1986), p. 134.

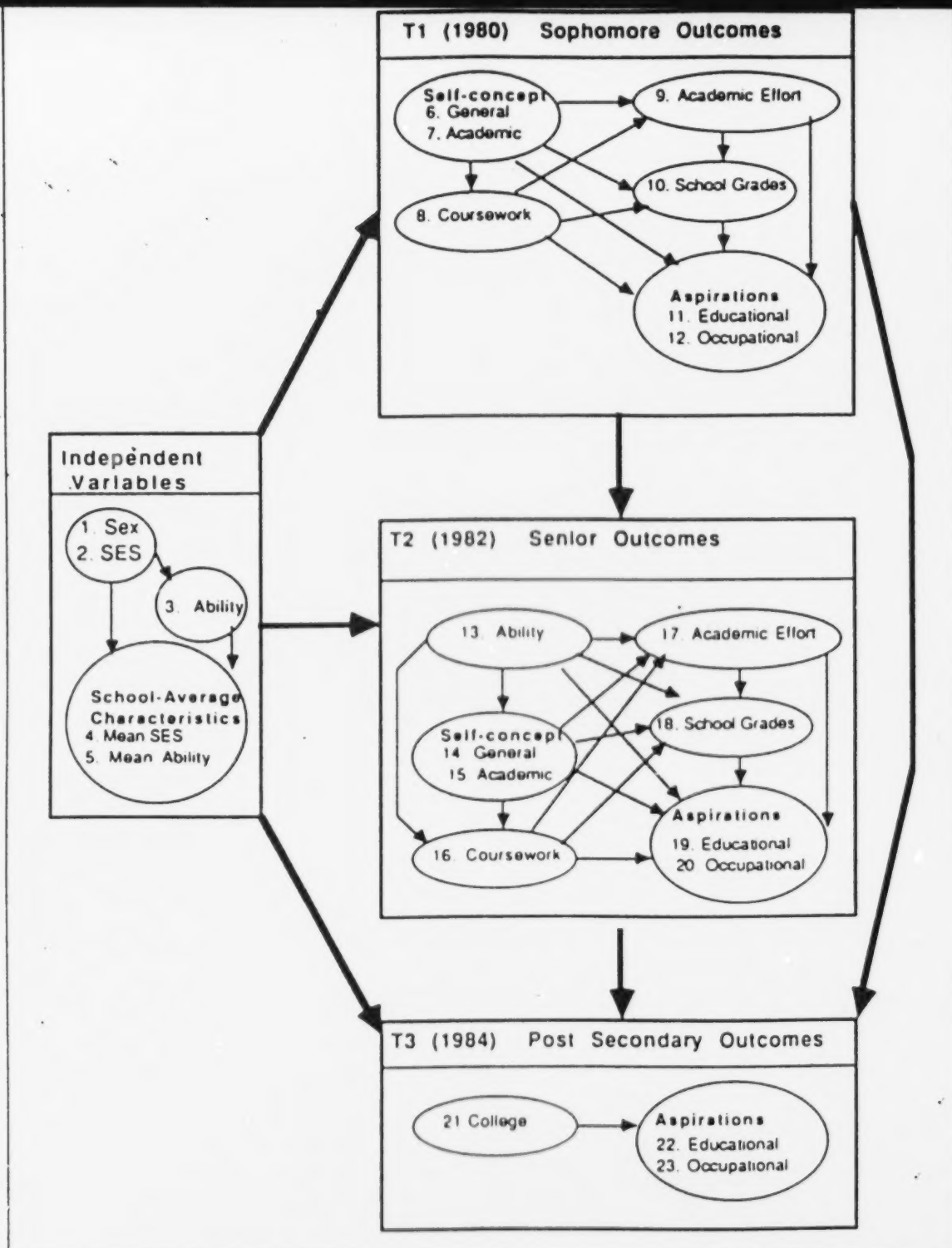


Figure 4 (Reproduced From Marsh, 1991d)

A path model positing a specific ordering of 23 variables based on their temporal ordering and previous theoretical research.

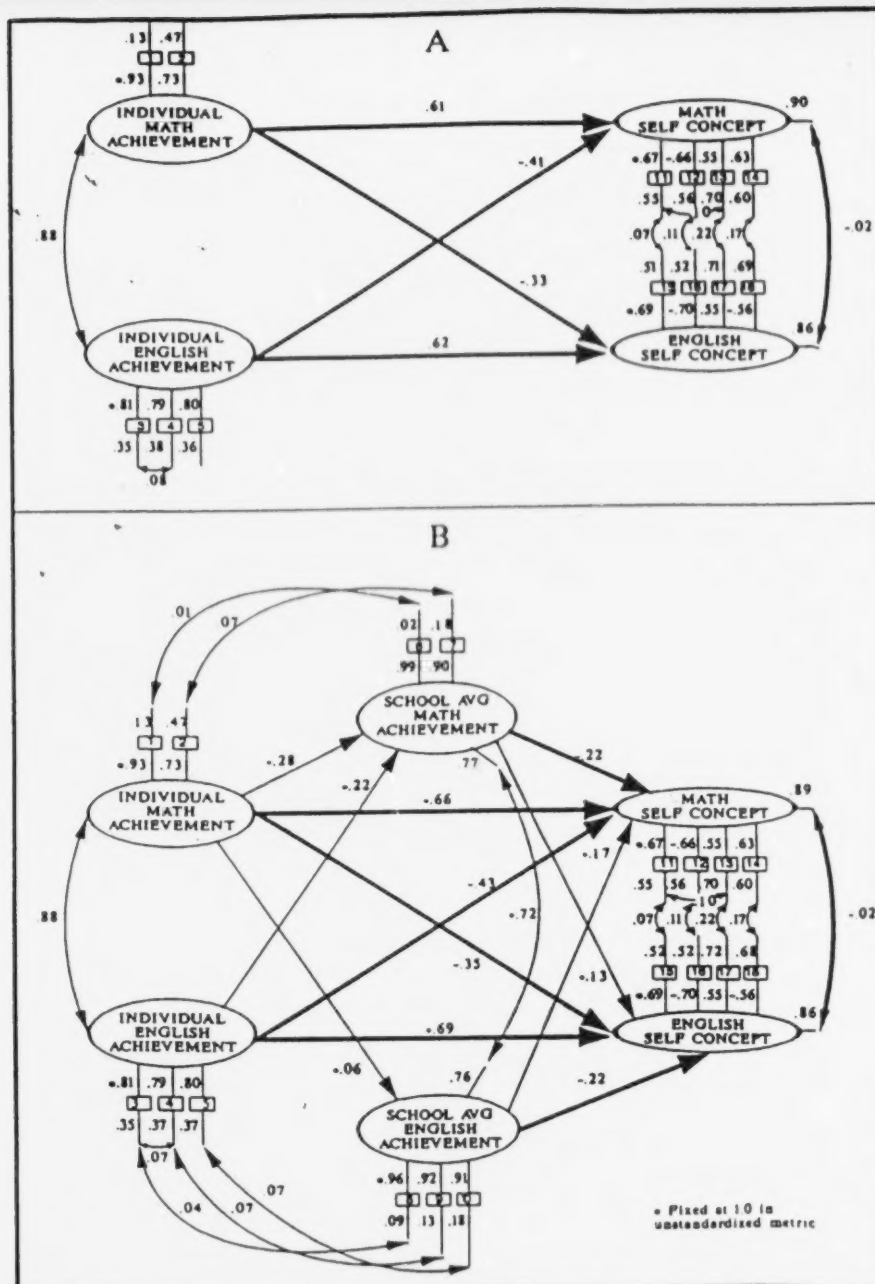


Figure 5 (Reproduced From Marsh, 1990a)

The structural parameter estimates for Models 1.3 (A) and 2.4 (B). (Model 1.3 relates individual math and English achievements to math and English self-concepts. School-average math and English achievements are added to Model 2.4. The corresponding coefficients based on other models are presented in Table 2. [The number boxes refer to the measured variables—see Table 1—and the latent constructs are indicated by circles. All the constructs have at least two indicators—i.e., the circles are associated with two or more boxes—and correlated uniquenesses are posited for some indicators. Path coefficients—the single-headed arrows going from left to right—represent relations between latent constructs.]